EFFECT OF YOGA- BASED MEDITATION ON PSYCHO-PHYSIOLOGICAL HEALTH OF CORONARY PATIENTS

A

Synopsis Submitted for the proposed research

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The widely known psychological risk factors in the aetiopathogenesis of coronary heart disease are stress, anxiety and depression. These may antedate heart attacks and even persist after myocardial infarction.

Coronary heart disease (CHD) is a general term that refers to illness caused by atherosclerosis, the narrowing of the coronary arteries, the vessels that supply the heart with blood. When these vessels become narrowed or closed, the flow of oxygen and nourishment to the heart is partially or completely obstructed. Temporary shortage of oxygen and nourishment frequently cause pain, called angina pectoris that radiates across the chest and arm. When severe deprivation occurs, a heart attack (myocardial infarction) can result.

CHD is also a disease of modernization, due at least in part to the alterations in diet and reduction in activity level that have accompanied modern life. Risk factors for CHD also include high blood pressure, diabetes, and cigarette smoking, obesity, high serum cholesterol level, and low level of physical activity (American Heart Association, 2004). Identifying patients with metabolic syndrome also helps to predict heart attacks. Metabolic syndrome is diagnosed when a person has three or more of the following problems: obesity centered around the waist; high blood pressure; low levels of HDL, the so-called good cholesterol; difficulty metabolizing blood sugar, an indicator of risk for diabetes; and high levels of triglycerides, which are related to bad cholesterol. High cardiovascular reactivity may also be a component of this cluster (Waldstein and Burns, 2003).

Heart disease has a family history component, being more common among the offspring of people who have had heart disease. This component may include a genetically based predisposition to cardiovascular reactivity, which may emerge early in life (Yamada, 2002) and which is exacerbated by lifestyle-related risk factors, including exposure to stress. However, taking all known risk factors together accounts for less than half of all newly diagnosed cases of CHD; accordingly, a number of risk factors remain to be identified, which target people who are at could risk for CHD early in the disease process.

Hypertension, or high blood pressure, occurs when the supply of blood through the vessels is excessive. It can occur when cardiac output is too high, which puts pressure on the arterial walls

as blood flow increases. It also occurs in response to peripheral resistance- that is, the resistance to blood flow in the small arteries of the body. Hypertension is a serious medical problem for several reasons. According to American Heart Association, 2004) estimates, one in four U.S adults has high blood pressure, but because there are no symptoms, nearly one third of these people don't know they have it. Moreover, hypertension is a risk factor for other disorders, such as kidney failure (American Heart Association, 2001).

Untreated hypertension can also adversely affect cognitive functioning, producing problems in learning, memory, attention, abstract reasoning, mental flexibility, and other cognitive skills. Even in healthy adults, elevated blood pressure appears to compromise cognitive functioning (Suhr, Stewart and France, 2004). These problems appear to be particularly significant among young hypertensive (Waldstein, 1996).

Hypertension is assessed by the levels of systolic and diastolic blood pressure as measured by a sphygmomanometer. Systolic blood pressure is the greater force developed during contraction of the heart's ventricles. It is sensitive both to the volume of blood leaving the heart and to the arteries' ability to stretch to accommodate blood. Diastolic pressure is the pressure in the arteries when the heart is relaxed; it is related to resistance of the blood flow.

Stress is a feeling that's created when we react to particular events. It's the body's way of rising to a challenge and preparing to meet a tough situation with focus, strength, stamina, and heightened alertness. The events that provoke stress are called **stressors**, and they cover a whole range of situations — everything from outright physical danger to making a class presentation or taking a semester's worth of your toughest subject.

The human body responds to stressors by activating the nervous system and specific hormones. The **hypothalamus** signals the **adrenal glands** to produce more of the hormones adrenaline and cortisol and release them into the bloodstream. These hormones speed up heart rate, breathing rate, blood pressure, and metabolism. Blood vessels open wider to let more blood flow to large muscle groups, putting our muscles on alert. Pupils dilate to improve vision. The liver releases some of its stored glucose to increase the body's energy. And sweat is produced to cool the body.

All of these physical changes prepare a person to react quickly and effectively to handle the pressure of the moment.

This natural reaction is known as the **stress response**. Working properly, the body's stress response enhances a person's ability to perform well under pressure. But the stress response can also cause problems when it overreacts or fails to turn off and reset itself properly. Some stressful situations can be extreme and may require special attention and care. Posttraumatic stress disorder is a very strong stress reaction that can develop in people who have lived through an extremely traumatic event, such as a serious car accident, a natural disaster like an earthquake, or an assault like rape.

Some people have anxiety problems that can cause them to overreact to stress, making even small difficulties seem like crises. If a person frequently feels tense, upset, worried, or stressed, it may be a sign of anxiety. Anxiety problems usually need attention, and many people turn to professional counselors for help in overcoming them. People who are experiencing stress overload may notice some of the following signs:

- Anxiety or panic attacks
- A feeling of being constantly pressured, hassled, and hurried
- Irritability and moodiness
- Physical symptoms, such as stomach problems, headaches, or even chest pain
- Allergic reactions, such as eczema or asthma
- Problems sleeping
- Drinking too much, smoking, overeating, or doing drugs
- Sadness or depression

Everyone experiences stress a little differently. Some people become angry and act out their stress or take it out on others. Some people internalize it and develop eating disorders or substance abuse problems. And some people who have a chronic illness may find that the symptoms of their illness flare up under an overload of stress.

Stress is a normal part of life. But if left unmanaged, stress can lead to emotional, psychological, and even physical problems, including heart disease, high blood pressure, chest pains, or irregular heartbeats. Medical researchers aren't sure exactly how stress increases the risk of heart disease. Stress itself might be a risk factor, or it could be that high levels of stress make other risk factors (such as high cholesterol or high blood pressure) worse. For example, if someone is under stress, his/her blood pressure goes up, he/she may overeat, he/she exercises less, and he/she may be more likely to smoke. If stress itself is a risk factor for heart disease, it could be because chronic stress exposes our body to unhealthy, persistently elevated levels of stress hormones like adrenaline and cortisol. High blood pressure can result from exposure to chronic social conflict and from job strain-namely, the combination of high demand with little control.

Fogoros (2011) suggested that emotional stress, of certain types and in certain people, can increase the risk of chronic heart disease, and can even trigger acute cardiac crises. Emotional stress is related to heart disease, not all emotional stress can be avoided, and not all of it is "bad." How we respond to the stress is extremely important in determining how much risk the stress we experience every day imposes on our heart.

Bower (2005) conducted a study with heart patients who practiced yoga for a long duration and survivors yielded modest improvements in sleep quality, mood, stress, heart related distress and overall quality of life. Yoga has been practiced for thousands of years to improve physical and emotional well-being.

The word Yoga comes from the Sanskrit word "Yuj" meaning to yoke, join or unite. This implies joining or integrating all aspects of the individual - body with mind and mind with soul - to achieve a happy, balanced and useful life, and spiritually, uniting the individual with the supreme.

In India, Yoga is considered one of the six branches of classical philosophy and is referred to throughout the *Vedas* - ancient Indian scriptures and amongst the oldest texts in existence. The *Upanishads* are also broadly philosophical treatises which postdate the *Vedas* and deal with the nature of the "soul" and universe.

According to the Yoga *Sutras* of Patanjali, the ultimate aim of Yoga is to reach "*Kaivalya*" (emancipation or ultimate freedom). This is the experience of one's innermost being or "soul" (the *Purusa*). Then one becomes free of chains of cause and effect (*Karma*) which tie us to continual reincarnation.

The most important benefit of yoga is physical and mental therapy. To get the maximum benefits of yoga one has to combine the practices of yogasanas, pranayama and meditation. Regular practice of asanas, pranayama and meditation can help such diverse ailments such as diabetes, blood pressure, digestive disorders, arthritis, arteriosclerosis, chronic fatigue, asthma, varicose veins and heart conditions. Laboratory tests have proved the yogi's increased abilities of consciously controlling autonomic or involuntary functions, such as temperature, heartbeat and blood pressure. Through the practice of yoga, we become aware of the interconnectedness between our emotional, mental and physical levels. Gradually this awareness leads to an understanding of the more subtle areas of existence.

The relaxation and exercise components of yoga have a major role to play in the treatment and prevention of high blood pressure (hypertension). A combination of biofeedback and yogic breathing and relaxation techniques has been found to lower blood pressure and reduce the need for high blood pressure medication in people suffering from it.

Meditation or contemplation involves focusing the mind upon a sound, phrase, prayer, object, visualized image, the breath, ritualized movements, or consciousness in order to increase awareness of the present moment, promote relaxation, reduce stress , and enhance personal or spiritual growth. Meditation can benefit people who are ill or overwhelmed by stress. It also promotes well-being in healthy people. In general, people who meditate regularly experience less anxiety and depression. They also report more enjoyment and appreciation of life, as well as better social relationships. Meditation produces a state of deep relaxation and a sense of balance, or equanimity. The Transcendental Meditation technique is a form of mantra meditation that, according to the TM organization, is effortless when used properly. The mantra is a sound that is thought (but not spoken) during meditation and as a vehicle that allows the individual's attention to travel naturally to a less active, quieter style of mental functioning. The technique is practiced morning and evening for 15–20 minutes each time. (Hunt, 2003).

According to Michael and Baime (1999) meditation allows one to fully experience intense emotions without losing composure. The consequence of emotional balance is greater insight regarding one's thoughts, feelings, and actions. Insight, in turn, promotes confidence and awareness. Meditation also facilitates a greater sense of calmness, empathy, and acceptance of self and others.

Meditation is sometimes suggested as a complement to medical treatments of disease; in particular, it is an important complementary therapy for both the treatment and prevention of many stress-related conditions. Regular meditation may reduce the number of symptoms experienced by patients with a wide range of illnesses and disorders. Based upon clinical evidence, as well as theory, meditation is seen as an appropriate therapy for panic disorder , generalized anxiety disorder , substance dependence and abuse, ulcers, colitis, chronic pain, psoriasis, and dysthymic disorder—a disorder that involves a steady, depressed mood for at least two years. Moreover, meditation is a valuable adjunct therapy for moderate hypertension (high blood pressure), prevention of cardiac arrest (heart attack), prevention of atherosclerosis (hardening of the arteries), arthritis (including fibromyalgia), cancer, insomnia, migraine, and stroke. It is a complementary therapy for moderating allergies and asthma because it reduces stress, which is prevalent in these conditions. Additionally, meditation may improve function or reduce symptoms of patients with neurologic disorders such as Parkinson's disease, multiple sclerosis, and epilepsy.

According to Ornish (2009) twenty eight people with high levels of blocked arteries and high risk of heart attack were placed on a program with regular practice of meditation, yoga, a low fat vegetarian diet, and exercise. Twenty people in the control group received conventional medical care endorsed by the AMA. At the end of a year, most of the experimental group reported that their chest pains had virtually disappeared; for 82% of the patients, arterial clogging had reversed. Those who were sickest at the start showed the most improvement. The control group had an increase in chest pain and arterial blockage worsened and Meditation significantly controls high blood pressure at levels comparable to widely used prescription drugs, and without the side effects of drugs.

Benson (1994) concluded that, 77% of individuals with high levels of stress were able to cool down, lower their blood pressure and cholesterol levels, simply by training themselves to stay calm.

Stress is a common condition, a response to a physical threat or psychological distress that generates a host of chemical and hormonal reactions in the body. In essence, the body prepares to fight or flee, pumping more blood to the heart and muscles and shutting down all non-essential functions. As a temporary state, this reaction serves the body well to defend itself. However, when the stress reaction is attenuated, the normal physical functions that have been either exaggerated or shut down in response become dysfunctional in this extreme state. Many have noted the benefits of exercise in diminishing the stress response. A host of studies points to the benefits of such exercise. Yoga, too, has been recommended and studied in its relationship to stress, although the studies are less scientifically replicable. Nonetheless, several researchers claim highly beneficial results from Yoga practice in alleviating stress and its effects. The practices recommended range from intense to moderate to relaxed asana sequences, plus pranayama and meditation. In all these approaches to dealing with stress, one common element stands out: the process is as important as the activity undertaken. Because it fosters self-awareness, Yoga is a promising approach for dealing with the stress response (Arora and Bhattacharjee, 2008).

Yoga can be very effective, combining many of the benefits of breathing, muscle relaxation, and meditation while toning and stretching the muscles. The benefits of yoga may be considerable. Numerous studies have found it beneficial for many conditions in which stress is an important factor, such as anxiety, headaches, high blood pressure, and asthma. It also elevates mood and improves concentration and the ability to focus **(**Scherwitz, 2006).

Coronary heart disease can be a caused of depression. Depression is a psychological condition that changes thinking and feeling, and also affects social behavior and sense of physical well-being. Sometimes feeling tired from working hard, or discouraged when faced with serious problems. This too, is not depression. These feelings usually pass within a few days or weeks, once we adjust to the stress. But, if these feelings linger, intensify, and begin to interfere with

work, school or family responsibilities, it may be depression. Depression is an important and emerging risk factor for heart failure among patients with coronary heart disease.

Depression has long had a popular link to cardiovascular disease and death. However, only during the last 15 years scientific evidence supporting this common wisdom has been available (Glassman, 2007). Since the early 1990s studies have reported prevalence of major depression between 17% and 27% in hospitalized patients with coronary artery disease (CAD) (Rudisch and Nemeroff, 2003).

Depression and cardiovascular disease does not occur by chance but the mechanisms responsible for this relationship are poorly understood. Platelet abnormalities, autonomic tone, and health behaviours have all been implicated. There exists also the possibility that depression and vascular disease share certain vulnerability genes (McCaffery, 2006).

Depression is a painful state, and it should be treated aggressively when indicators of benefit are present; major depression following myocardial infarction is consistently associated with about a 3-fold increase in cardiac mortality and evidence continues to accumulate (Glassman and Bigger, 2007).

According to Rudisch (2009) patients with heart disease who are subsequently diagnosed with depression are at greater risk for heart failure (HF), a condition in which the heart can't pump enough blood throughout the body.

Kathleen (2010) found that transcendental meditation is to ease symptoms of depression, in turn reducing heart disease risk and improve health outcomes for individuals at high risk for morbidity and mortality from depression that can lead to heart disease.

It has also been found that cognitive impairment occurs when problems with thought processes occur. It can include loss of higher reasoning, forgetfulness, learning disabilities, concentration difficulties, decreased intelligence, and other reductions in mental functions. Cognitive impairment may be present at birth or can occur at any point in a person’s lifespan.

Cognitive impairment expresses a huge range of mental deficits from the very minor to the extremely severe in adults and children suffering from a variety of conditions. People can be impaired temporarily, have conditions diagnosed as mild cognitive impairment, suffer from illness creating progressive impairment, or simply have lower levels of ability to learn or remember (as with mental retardation) that will remain constant throughout life. Anyone who is impaired cognitively may lack, to greater or lesser degree, certain "normal" thinking facilities like the ability to remember, learn at a normal pace, adapt behaviour to social settings, and process or understand information.

According to Ahto, Isoaho & Laippala (1999) Coronary heart disease (CHD) and decline in cognitive functioning and dementia are common problems in the elderly. Cardiovascular diseases (CVDs) are connected with vascular dementia, but less is known about cognitive functioning among elderly patients with CHD.

Ahto and Isoaho (1998) concluded that the impact of coronary heart disease (CHD) on elderly patients' functional abilities is of growing interest because of the increasing number of people that survive the disease. CHD patients have greater limitations in their functional ability than matched controls, which may depend on the severity of the disease. Especially male patients' limitations in physical abilities may be influenced by the fact that men with CHD are more likely to be depressed.

George et al (2007) studied that heart failure (HF) is becoming increasingly common, and in addition to a high burden of morbidity and mortality, HF has an enormous financial impact. Though disproportionately affected by HF, the elderly are less likely to receive recommended therapies, in part because clinical trials of HF therapy have ignored outcomes of importance to this population, including impaired cognitive function (ICF). Evidence suggests that these abnormalities may be partially reversible with standard HF therapy.

HF was associated with poorer cognition at baseline. The rate of cognitive decline over four years was not significantly different among persons with HF, coronary artery disease, diabetes,

or controls without clinical cardiovascular disease, likely reflecting attrition of very elderly persons with severe HF and thus more severe ICF (Tilvis, Kahonen and Jolkkonen ,2004).

Raymond (2006) studied that heart failure (HF) and cognitive impairment are common medical conditions that are becoming increasingly prevalent in the aging Western population. They are associated with increased mortality, particularly when they occur simultaneously. Evidence suggests that HF is independently associated with impairment in various cognitive domains.

Cognitive impairment or dementia may coincide with chronic HF for some individuals; an increasing body of evidence suggests that decreased heart function, as measured by indices of low cardiac output, is independently associated with impairment in various cognitive domains (Trojano, 2003).

Ahlgren and Lundquist (2003) concluded that cognitive dysfunction has been reported in patients who suffer from a variety of cardiovascular disorders. It is well documented among hypertensive patients after coronary artery bypass graft (CABG) surgery.

Vogel, Costello, and Krucoff (2007) said that "Transcendental Meditation (TM) has been shown to not only improve blood pressure but also the insulin resistance components of metabolic syndrome and cardiac autonomic nervous system tone" in subjects with cardiovascular disease, compared with matched controls given only health education.
Olivo (2009) reported review on research by MUM graduate Vernon Barnes and his colleagues at the Medical College of Georgia on variables related to blood pressure that found that, compared to an eyes-closed relaxation control group, the TM group had increased cardiac output and decreased peripheral resistance as well as decreased systolic blood pressure.

Black, Milam and Sussman (2009) studied several randomized controlled trials on school students that found an improvement in blood pressure and cardiovascular function in the TM group compared to health education. In addition, they reported on a randomized controlled trial on psychosocial and behavioral outcomes that compared TM to health education and found that the TM group had decreased absentee periods, rule infractions, and suspension days, but found no difference in the TM and control groups in regard to tardiness, lifestyle, or stress.

Horowitz (2010) found that decreased blood pressure in the TM group that was associated with a reduction in stress and hostility, and an increase in coping.

It is a fact that some emotionally stressful situation precedes myocardial infarction. Persistent emotional arousal may have an adverse, direct or indirect, effect on physical and mental health.

Several other factors such as severe fatigue, anxiety, anger, hopelessness and loneliness have also been proposed to be precursors of sudden cardiac death. It has also been reported that cardiovascular reactivity is more pronounced in borderline hypertensive and hypertensive subjects. Green (2009) reported that 33 to 50 percent patients who die from an initial myocardial infarction might have been significantly depressed for some time prior to the infarction. Patients with clinical depression are also at increased risk for mortality during and after cardiac surgery. These patients experience not only the suffering and despair associated with clinical depression but are also at increased risk for further morbidity and mortality due to their heart disease.

Meditation is being increasingly behavior modification technique for stress- related disease. Yoga based intervention produces beneficial effects on both physiological determinants and psychological risk factors or associated with heart disease. The present study is an effort in this direction.

METHOD

PURPOSE: - The main purpose of the present study is to examine the effect of a simple yoga-based technique of meditation on anxiety, depression, cognitive impairment, alpha EEG frequency, blood pressure and heart rate in persons having coronary heart disease.

HYPOTHESIS: - It is hypothesized that meditation would produce ameliorating effects on both physiological determinants and psychological risk factors associated with the disease.

DEFINITION OF TERMS USED

- **Meditation:** Meditation is a mental exercise in which we direct our mind to think inwardly by shutting our sense organs to external stimulations. It is a Vedic exercise which can be used as a powerful instrument to restrain sense organs, control autonomic nervous system and also to attain super consciousness.

PSYCHOLOGICAL FACTORS

- **Anxiety:-** Anxiety is a psychological and physiological state characterized by somatic, emotional, cognitive, and behavioral components.

- **Depression:** - Depression is a common mental disorder that presents with depressed mood, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, low energy, and poor concentration.

- **Brain Dysfunction: -** A mild impairment of brain function that affects perception, behaviour and academic ability and it characterized by difficulty in writing, hyperactivity or mental retardation.

PHYSIOLOGICAL FACTORS

- **EEG**: - Electroencephalography (EEG) is the recording of electrical activity along the scalp. The brain generates rhythmical potentials which originate in the individual neurons of the brain. These potentials get summated as millions of cell discharge synchronously and appear as a surface waveform, the recording of which is known as the electroencephalogram. In clinical contexts, EEG refers to the recording of the brain's spontaneous electrical activity over a short period of time, usually 20–40 minutes, as recorded from multiple electrodes placed on the

scalp. The EEG reveals not what is thought, but shows the context in which thinking occurs---state of arousal, state of vigilance and alertness, etc. A predominant feature of the EEG is rhythmic activity, or periodicity. Recent findings in the neurosciences indicate that this may be the means by which the brain maintains continuity of state, and even working memory.

- **Blood Pressure:** -The blood pressure is the pressure of the blood within the arteries. It is produced primarily by the contraction of the heart muscle. Its measurement is recorded by two numbers. The first (systolic pressure) is measured after the heart contracts and is highest. The second (diastolic pressure) is measured before the heart contracts and lowest. A blood pressure cuff is used to measure the pressure.

- **Heart Rate: -** Heart rate is the number of heart beat per minute. The measurement is taken when the lower heart chamber contract, sending blood flowing throughout the cardiovascular system.

SAMPLE: - The total sample for the present study will be consisted of 100 coronary heart disease patients, age range from 30 to 60 years who will have at least one infarction or have recurrent infarction at least one year prior to the commencement of the present research. 50 cases will be on conventional treatment (control group) and the remaining 50 will be practicing yoga-based meditation along with conventional treatment (meditation group). Patients will be selected from S.N. Medical College and other renowned hospital of Agra. These subjects will be assigned to the two groups randomly. The patients, whose age will be below 30 years, will be excluded because of unidentifiable causes and those above 60 years to avoid the effect of aging, i.e. degenerative processes, senility and other predominant psycho-social factors specific to that age. All the patients will be matched in terms of age, marital status, education and religion. Only those patients will be taken who belong to upper socio-economic status and will have education at least up to the first degree level.

DESIGN: - Expost facto research design will be used.

MEASURES:

Psychological Measures

- For measuring **Depression, the Beck Depression Inventory II** (BDI- II: Beck et al. 1996) will be used to determine depression scores. The BDI is a 21- items scale measuring attitudes and

symptoms associated with various aspects of depression particularly the cognitive, behavioral, affective and somatic aspect. Respondents are required to tick one of the four alternatives, providing a score of 0 to 3, for each item. The scores on the total test thus range from 0 to 63; higher scores indicating greater severity of depressive symptomatology.

- For measuring **Anxiety, the State- Trait Anxiety Inventory** developed by Spielberger (1983) will be used. It comprises separate self-report scales for measuring state and trait anxiety. The S-Anxiety scale (STAI From Y-1) consists of twenty statements that evaluate how respondents feel 'night now, at this moment." The T- Anxiety scale (STAI Form Y-2) consists of twenty statements that assess how people generally feel.

- For measuring **Brain Dysfunction, the PGI Battery of Brain Dysfunction** developed by Pershad and Verma (1989) will be used.

Description of the test: - This test consists of five subtests. (i) Memory Scale (ii) Battery of Performance Test of Intelligence (iii) Verbal Adult Intelligence Scale (iv) Nahar-Benson Test (v) Bender Visual Motor Gestalt Test.

Memory Scale includes verbal and nonverbal material measures remote, recent and immediate short term, very short term, intermediate term and long term memories. There are ten subtests in memory scale, standardized on adult subjects in the age range of 20-45 years.

Second test is an adaptation of Bhatia's Battery of Performance Test of Intelligence **(Bhatia, 1955)** consisting of Koh's Block Design Test and Pass-a-long Test. It is a performance test of Intelligence. Third test of the battery is verbal test of intelligence which includes four subtests (i) Information (ii) Digit Span (iii) Arithmetic and (iv) Comprehension. These subtests were sought from the Wechsler's Adult Intelligence Scale.

The fourth Nahor-Benson Test consists of 8 cards. Out of these five cards contain a design each, and three cards contain the instructions to be followed, i.e., subjects are required to draw shape of objects **(Pershad and Verma, 1978**). Five designs are based on developmental pattern.

Fifth test of the battery is **Bender Visual-Motor Gestalt Test (BVMGT)** of Visio-motor coordination which consists of nine figures characterized by Bender's gestalt. It measures visual activity and motor functioning.

Instructions and Scoring: - Instructions will be given and scoring will done according to the manual.

RELIABILITY OF THE TEST: - Test-retest reliability over a period of one week ranges from .69 to .85 for 10 subjects of Memory Scale (N=40) and for the total Memory Scale 90 (test-retest and split-half). Bhatia's Battery of Performance gives Test Quotients (T.Q.) for two subtests which allow comparability of functions measured by Koh's Design Test and Pass-a-long Test. T.Qs. of Koh's Block and Pass-a-long test were found to be significantly correlated with the I.Qs. on VAIS, WAPIS and Standard Progressive Matrices. Distribution of I.Q. formed a N.P.C. In Verbal Adult Intelligence Scale the test-retest reliability over a period of 1-2 weeks was found to be in range of .87 to .98 (N=99) and split-half reliability in the range of .59 to .85 for four subtests separately for male-female of different educational levels.

VALIDITY OF THE TEST: - PGI memory scale had satisfactory cross-validity and provides quintile norms and profile. Scores of subjects suffering from organic brain pathology, functional psychosis and neurosis, fall in the lowest 2^{nd} and middle quintiles respectively. In Bhatia's Battery of Performance tests, subjects of low educational obtained significantly low scores (Pershad, Mahajan & Verma, 1988). These results show the high validity of the test. In verbal Adult Intelligence Scale scores on the entire four subtests tend to increase with increase in education. Subjects using mass media like Radio, T.V., Newspapers obtained significantly higher scores than non mass media users on all the four subjects (Verma, Pershad Singh & Singh, 1982).

Physiological measures

- For measuring **EEG and ECG a computerized polygraph (Physiopac PP 4)** will be used.

Alpha EEG Frequency: EEG will be recorded using in electrodes applied to 19 sites of the interventional 10-20 system (F_1, F_2, F_3, F_4, F_7, F_8, C_3, C_4, T_3, T_4, T_5, T_6, P_3, P_4, O_1, Oz, Fz, Cz, Pz, Jasper, 1958) with a linked- ear reference EEG recordings will be done for three minutes while the patients will be lying awake with eyes closed, against the averaged signals of both ear electrodes ([A1+ A2]/2). Time constant 0.3s, Filter 35Hz; Rescher & Rappelsberger, 1999) and digitized at the rate of 125/s by a signal processing unit interfaced with a Macintosh Plus computer. For this study only the integrated figure of alpha EEG recording will be used for analysis.

Systolic- diastolic blood pressure and Heart rate: -Blood pressure (BP) and heart rate (HR) will be recorded using an HEM- 732 C-C1 (Mx2) automatic digital blood pressure monitor (Omron Corporation, Tokyo, Japan). The Omron monitor detects blood pressure to an accuracy of ± 2% and the pulse to an accuracy of ± 5% of reading. Systolic and diastolic blood pressures, detected oscillometrically, will be displayed digitally on the monitor's front panel to an accuracy of ±3 mmHg. Cuff (480x180mm) deflation will be approximately 5mmHg/s. Heart rate will be recorded automatically by counting the number of BP oscillations during each cycle of BP measurement. The BP and HR recording will be done three times with an internal of three minutes in between.

PROCEDURE: - After the EEG, BP and HR recordings the STAI, the Brain Dysfunction and BDI will be administered on each subject. Each subject will be tested individually and will be provided data on all measures. The order of electrophysiological recordings and the test administration will be the same for all the subjects: EEG, BP, HR, STAI, BRAIN DYSFUNCTION and BDI.

Meditation Procedure: The subject in the meditation group will be first introduced to meditation practice. On reporting to the laboratory, they will be given training session, they will be asked to sit comfortably in a relaxed manner on a mattress spread on the floor of a room. The subjects will be required to have straight back without rigidity, ears in line with shoulders and the tip of the nose in line with the navel (Patel, 1993). They will also tell to sit with eyes closed. The subjects will be instructed to take a deep breath slowly, hold it for a few seconds, exhale it slowly, and then repeat the procedure 10 times. They will be then required to use the same procedure 10 times with each of the nostrils, inhaling and exhaling with the same nostril. Afterward, the same procedure will have to be repeated but by inhaling with one nostril and exhaling with other. Finally, the subjects will be required to concentrate on their nostril breathing (e.g. abdominal muscles moving inward with every inhale and outward with every exhale), without thinking anything, for 20 minutes. All through the subjects are required to make sure that their breathing is regular, slow and rhythmical. Toward the end, they will be asked to have a few deep breaths and then get up for routine work. The training and practice under the supervision of the instructor continued till the subjects will be able to do meditation at home. These subjects will also be requested to do the meditation practice at home twice a day several hours apart (e.g., in the morning before breakfast and again in the evening after supper) for about 25-30 minute each time. They will also be

requested to make sure that the distractions of noise, light and activity of other people are minimal. Moreover, meditation will also to be practiced after emptying the bladder and bowel. Regularity of home practice will be monitored by telephonic contacts.

ANALYSIS:- The duration of the study will be six months. The assessments will be done at the commencement of the study for determining baseline and will be repeated every two months for both control and meditation groups.

To study the differences between the baseline (pre-treatment) scores and the scores obtained after six months (post-treatment) the significance of differences between the mean of these two conditions will be tested by the t-test. Two types of comparisons will be made: intra group comparisons i.e. pre-vs post treatment comparisons for the control as well as the meditation group, and inter group comparisons i.e. control vs meditation group comparisons for the pre treatment as well as the post treatment conditions.

References

- Ahlgren, E. &Lundquist, A. (2003). Neurocognitive impairment and driving performance after coronary artery bypass surgery. *Eur. J. Cardiothorac Surg., 23*(67), 334-340.
- Ahto, M. &Isoaho, R. (1998). Functional abilities of elderly coronary heart disease patients. *Journal of Gerontology, 10*(2), 127-36.
- Ahto, M., Isoaho, R. & Laippala, P. (1999). Cognitive impairment among elderly coronary heart disease patients. *Journal of Gerontology, 45*(2), 87-95.
- American Heart Association, (2001). *Heart and Stroke Statistical Update*. Dallas, TX: Author.
- American Heart Association, (2004). *Heart disease and stroke statistics.* Retrieved from: http:// www.americanheart.org/presenter.jhtml/? = 1928.
- Arora, S. & Bhattacharjee, J. (2008). Yoga is a promising approach for dealing with the stress response. *International Journal of Yoga, 1*(2), 45–55.
- Beck, A. T., Steer, R. A., &Brown, G.K. (1996). *Beck Depression Inventory-II Edition*. The Psychological Corporation, U.S.A.
- Bendar, L. (1938). A Visual Motor Gestalt Test and its clinical use. *American Orthopsychiatric Association. Research Monograph No, 3.*
- Benson, H. (1994). Effectiveness of Meditation in Reducing Stress. The Education Initiative, *Mind/Body Medical Institute*, Harvard.
- Bhatia, C. M. (1955). *Manual for Bhatia's Battery of Performance Test of Intelligence*. Oxford University: Bombay Press.
- Black, D.S., Milam, J. & Sussman, S. (2009). "Sitting Meditation Interventions among Youth: A Review of Treatment Efficacy". *Pediatrics/ American Academy of Pediatrics, 124*(3), 536.

- Bower, J. E .(2005). "Yoga for Heart patients and survivors". *Heart Care 12* (3): 165–171.
- Fogoros, R.N. (2011). Health's Disease and Condition Content is reviewed by *Medical Review Board.*
- George, A.H., Patterson, C.J., Demers, C., Onge, J., Turpie, I. D. &McKelvie, R.S. (2007). Heart failure and cognitive impairment: challenges and opportunities. *Journal of Clin Interv Aging, 2*(2), 209-218
- Glassman, A. H. (2007). Depression and Cardiovascular Comordity. *Dialogaes Clin. Neurosci*., *9*(1), 9-17.
- Glassman, A.H. & Bigger, J.T. (2007). Heart rate variability in adult coronary syndrome patients with major depression, intelligence of sortaline and mood improvement. *Arch. Gen. Psychiatry,* 64-9.
- Green, S.W. (2009). Psychological aspects of sudden death. *Archives of International Medicine, 129*(3), 725-731.
- Horowitz, S. (2010). "Health Benefits of Meditation: What the Newest Research shows. "Alternatives and Complementary Therapies. *Journal of Health and Science, 16*(4), 223-228.
- Hunt, S. (2003). Alternative religious: a sociological introduction. Aldershot, Hampshire, England; Burlington, VT: Ash gate. 1970198.
- Jasper, H.H. (1958). Report to the committee on methods of clinical examination in electroencephalography. Appendix: The ten-twenty system of the International Federation. *Electrocephalography and Clinical Neurophysiology, 10*(2), 371-375.
- Kathleen, B. R. N. (2010). Transcendental Meditation Eases Depression Reduces Heart Disease Risk. Retrieved from http://www.montroseplace.coza/depression.

- McCaffoy, J.M. (2006). Common genetic vulnerabilty to depression symptoms and coronary artery disease: inflammation and serotonin. *Psychosom Med. , 68*(2), 187-200.

- Michael, J. & Baime, A. (1999). "Meditation and mindfulness." Is Essential of Complementary and Alternative Medicine? New York: Avon Books.

- Olivo, E. (2009). "Protection throughout the life span: The Psychoneuroimmunologic Impact of Indo- Tibetan Meditation and yogic Practice". *Annals of the New York Academy of Sciences, 43*(1172), 163-171.

- Ornish, D. (2009). Can lifestyle changes reverse coronary heart disease? The Lifestyle Heart Trial. Lancet, *336*(8708), 129-133.

- Patel, C. (1993). Yoga based therapy. In P.M. Lehrer & R.L. Woolfolk (eds), *Principles and Practices of Stress Management*, (2nd ed.), 89-137. New York: Guilford Press.
- Pershad, D. & Verma, S.K. (1978). Cross validation of screening test for organic brain disease. *Neurology India, 26*(4), 81-91.
- Pershad, D. & Verma, S.K. (1989). *Handbook for P.G.I. Battery of Brain Dysfunction*. National Psychological Corporation. Agra.

- Raymond, L.C. (2006). Cognitive impairment in heart failure: A systematic review of the literature. Eur. *J. Heart Fail, 9*(5), 440-449.

- Reschler, B. & Rappelsberger, P. (1999). Gender dependent EEG- Changes during a mental rotation task. *International Journal of Psychophysiology, 33*(4), 209-222.

- Rudisch, B. & Nemeroff, C. B. (2003). Epidemiology of comorbid coronary artery disease and depression. *Biol. Psychiatry, 54*(3), 227-240.
- Rudish, B. (2009). Depression after heart disease ups risk of heart failure. *Journal of the American College of Cardiology, 59*(5), 526-540.

- Scherwitz, L. (2006). The use of yoga, relaxation and meditation is effective in the rehabilitation of heart patient. Retrieved from http://www.yogameditation.com/.../most of the stress we generate ourselves.

- Spilberger, C. D. (1983). *State-Trait Anxiety Inventory (STAI) Form Y for Adults.* Mind Garden: Palo Alto California.
- Suhr, J.A., Stewart, J.C., & France, C.R.(2004). The relationship between blood pressure and cognitive performance in the Third National Health and Nutrition Examination Survey (NHANESIII). *Psychosomatic Medicine, 66*(5), 291-297.
- Tilvis, R.S., Kahonen, M.K. & Jolkkonen, J. (2004). Predictors of cognitive decline and mortality of aged people over a 10- year period. *Journal of Gerontol. Med. Sci., 5*(A), 268-74.
- Trojano, L. (2003). Cognitive impairment: a key feature of congestive heart failure in the elderly. *J. Neurol., 250*(16), 1456-1463.
- Vogel, J., Costello, R. & Krucoff, M. (2007). *Heart Disease: A Textbook of Cardiovascular Medicine*. 1157.
- Waldstein, S.R. (1996). Hypertension and neuropsychological performance in men: Interactive effects of age. *Health Psychology*, *14*(1), 102-109.
- Waldstein, S.R., & Burns, H.O. (2003). Interactive relative of insulin and gender to cardiovascular reactivity in healthy young adults. *Annals of Behavioral Medicine*, *25*(4), 163-171.
- Yamada, Y. (2002). Prediction of the risk of myocardial infarction from polymorphisms in candidate gems. *New England Journal of Medicine*, *347*(21), 1916-1923, http://www.nejm.org.